

Specification for a switchboard cut out for a rectangular case with front frame measurement as follows:

B = 96 mm and H = 192 mm to be built in vertically

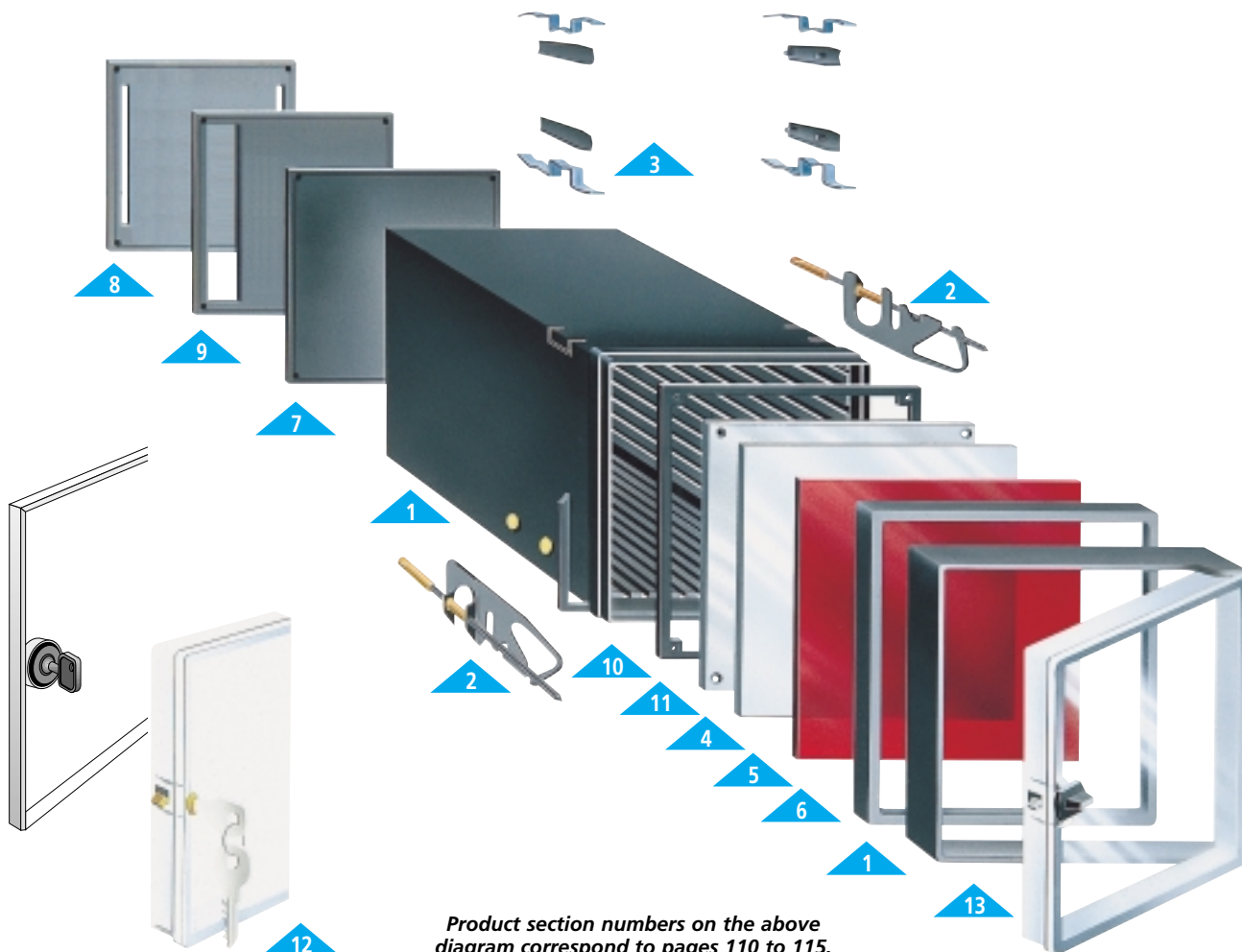
**Cut out 96 x 192 DIN 43700/IEC 61554**

Specification for a switchboard cut out for a rectangular case with front frame measurement as follows:

H = 192 mm and B = 96 mm to be built in horizontally

**Cut out 192 x 96 DIN 43700/IEC 61554**

Type	H	B	I1	Permitted tolerance	I2	Permitted tolerance
Square	48	48	45	+ 0,6	45	+ 0,6
	72	72	68	+ 0,7	68	+ 0,7
	96	96	92	+ 0,8	92	+ 0,8
	144	144	138	+ 1,0	138	+ 1,0
	192	192	186	+ 1,1	186	+ 1,1
Rectangular	48	24	45	+ 0,6	22,2	+ 0,3
	72	24	68	+ 0,7	22,2	+ 0,3
	96	24	92	+ 0,8	22,2	+ 0,3
	72	36	68	+ 0,7	33	+ 0,6
	96	48	92	+ 0,8	45	+ 0,6
	144	72	138	+ 1,0	68	+ 0,7
	144	96	138	+ 1,0	92	+ 0,8
	192	96	186	+ 1,1	92	+ 0,8
	192	144	186	+ 1,1	138	+ 1,0
	288	144	282	+ 1,1	138	+ 1,0



Product section numbers on the above diagram correspond to pages 110 to 115.

## The largest range of housings in "One Piece" moulded plastic

The design allows for universal use; the inside of the case is lined with guiding grooves to take cards. On both the front and back are threaded inserts (M2), and on the side are fittings to take fixing clamps.

The front frame which is easy to fit securely is normally included in the delivery. The rear wall is also constructed from "Noryl" and fits exactly into the case.

### Further interesting points:

- 1) For the initial one-off cost of the necessary tools, all the cases of type 445 can be modified to your individual requirement as follows:
  - a) the exact depth of the case
  - b) the position and arrangement of the circuit board guides
  - c) the depth of the indentation to take either the front plate or sheet
- 2) The Noryl rear wall can also be modified to your own specification for minimal tool cost as follows:
  - a) apertures (e.g. ventilation slots)
  - b) firm's trade name and address in raised lettering

Only your cases are produced using these tool kits, so that you can really call your cases your own!

For a small quantity, we can machine the cases and rear walls with our modern CNC-machining centre.

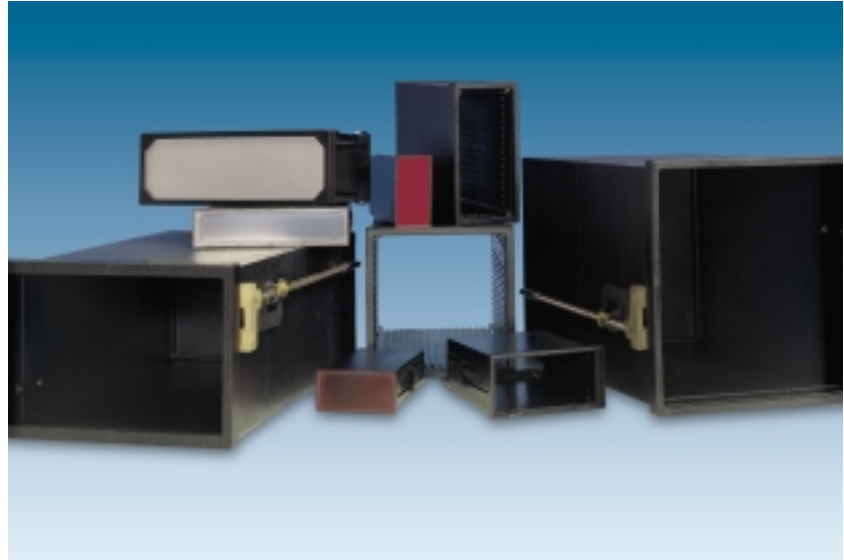
On the 01.01.1996 the EMI recommendation 89/336/EWG become effective. This recommendation is valid within the EC (European Community) and covers all electric and electronic devices which can cause electromagnetic interference or which can be disturbed by such interference.

In order to achieve EMI resistance or to avoid transmission of interference it is necessary to cover these devices with a conductive coating.

This can be obtained by the use of metallic cases or cases made of plastic, which is usually dielectric, by the use of conducting metallic coating - a saving of costs and weight.

Conductive surfaces can be obtained by lining the interior with metal foil, by galvanising, by vacuum evaporation, by metal plasma spraying or by using apra-norm coatings.

The apra-norm coating is a high quality conductive coating with excellent conduction, excellent



### Excellent properties of the material:

The DIN-cases and rear-wall are constructed from glassfibre reinforced Noryl SE1 GFN2 which has excellent mechanical and electrical properties.

### Characteristics:

Bending strength acc. to  
DIN 53452.....140 Mpa  
Tensile strength acc. to  
DIN 53455.....90 Mpa  
Hardness, H 358/30 DIN 53456 122 Mpa  
Water absorption acc. to  
ASTM D 570 only.....0,07 %

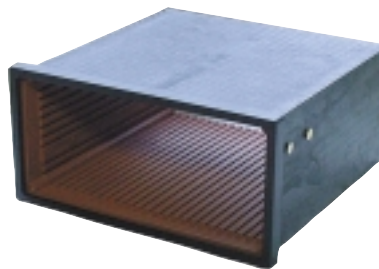
### Electrical properties:

Specific resistance..... $>10^{15}$  Ohm  
Dielectric strength acc. to  
DIN 53481.....250 kV/cm  
In case of mounting devices with line voltage over 50V please note the low tension recommendation.

### Thermal properties:

Shape stability acc. to Vicat (B).....150°  
Fire safety properties:  
It is self-extinguishing and non-dripping!  
Flameproof UL 94V1

## Conducting coating



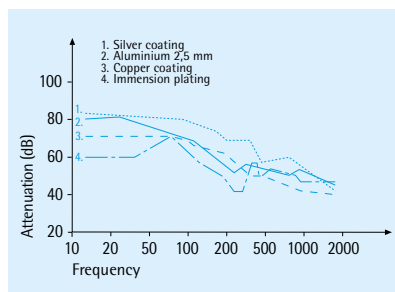
corrosion resistance and a convincing cost-performance ratio.










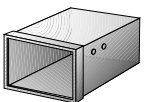
### Technical Information

The apra-norm coatings were developed to produce effective screening against EMI and to give protection against electrostatic discharge (or loading) and to earth sensitive electronic equipment. We offer copper coating as standard delivery, as it has high screening properties, is a good conductor and is economical.

### Physical properties:

Surface resistance:  
 $< 0,25 \Omega/\text{square}$  at 50  $\mu\text{m}$  thickness  
Attenuation:  
 $> 60 \text{ dB}$  at 50  $\mu\text{m}$  acc.  
to ASTM ES-7-83  
Adhesion:  
5 B (excellent) acc. to ASTM 3359 B  
Pencil hardness:  $> 9\text{H}$   
Max. application temperature: 95°C



B	H	T (ca.)	t (ca.)	1	2	3	4	5	
	24	60,0	53,0	445-440	440-001	441-440		445-451	
		82,5	75,5	445-441	440-005	441-441			
					440-009				
		107,0	100,0	445-444		441-444			
	48	60,5	53,5	445-120	440-001	441-120	445-130	445-131	
		82,5	75,5	445-121	440-005	441-121			
		116,5	109,5	445-122	440-009	441-122			
		138,5	131,5	445-123		441-123			
		107,0	100,0	445-124		441-124			
		163,0	156,0	445-125		441-125			
	24	60,0	53,0	445-420	440-001	441-420		445-431	
		82,5	75,5	445-421	440-005	441-421			
		107,0	100,0	445-424	440-009	441-424			
	36	60,5	53,5	445-040	440-001	441-040	445-050	445-051	
		82,5	75,5	445-041	440-005	441-041			
		116,5	109,5	445-042	440-009	441-042			
		107,0	100,0	445-044		441-044			
	48	60,5	53,5	445-140	440-001		445-150	445-151	
		82,5	75,5	445-141	440-005				
		116,5	109,5	445-142	440-009				
		107,0	100,0	445-144					
	72	60,5	53,5	445-220	440-001	441-220	445-230	445-231	
		82,5	75,5	445-221	440-005	441-221			
		116,5	109,5	445-222	440-009	441-222			
		138,5	131,5	445-223		441-223			
		107,0	100,0	445-224		441-224			
		163,0	156,0	445-225		441-225			
		209,0	201,0	445-226		441-226			
	24	60,5	53,5	445-100	440-001	441-100		445-111	
		82,5	75,5	445-101	440-005	441-101			
		116,5	109,5	445-102	440-009	441-102			
		107,0	100,0	445-104		441-104			
	48	60,5	53,5	445-160	440-001	441-160	445-170	445-171	
		82,5	75,5	445-161	440-005	441-161			
		116,5	109,5	445-162	440-009	441-162			
		138,5	131,5	445-163		441-163			
		107,0	100,0	445-164		441-164			
		163,0	156,0	445-165		441-165			
	48	60,5	53,5	445-760	440-001	441-760	445-170	445-171	
		82,5	75,5	445-761	440-005	441-761			
		116,5	109,5	445-762	440-009	441-762			
		138,5	131,5	445-763		441-763			
		107,0	100,0	445-764		441-764			
		163,0	156,0	445-765		441-765			
	72	60,5	53,5	445-240	440-001		445-250	445-251	
		82,5	75,5	445-241	440-005				
		116,5	109,5	445-242	443-001				
		138,5	131,5	445-243	440-009				
		107,0	100,0	445-244					
		163,0	156,0	445-245					
		209,0	201,0	445-246					

Case  
DIN 43 700 / IEC 61554  
Fixing / Screws  
"Panel-Clip"  
DIN 43 700 / IEC 61554  
Front panel  
Aluminium 1,5 mm  
Cover plate  
Aluminium 1,5 mm

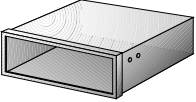
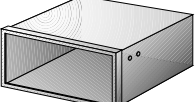
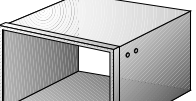
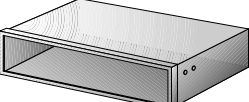
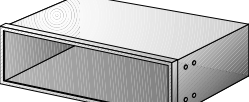
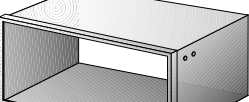
6 Filter Screen	7 Rear wall closed	8 Rear wall with slots	9 Rear wall for terminals	10 Sealing between case and panel	11 Sealing behind front panel	12 Transparent door with lock	13 Transparent door with sash fastener	14 Packing
445-452-xx	445-453-01	445-453-02	Terminals page 13					
445-132-xx	445-133-01	445-133-02	145-133-03	445-135-01	445-135-02			
445-432-xx	445-433-01	445-433-02						
445-052-xx	445-053-01	445-053-02	445-053-03	445-055-01				
445-152-xx	445-153-01	445-153-02						
445-232-xx	445-233-01	445-233-02	445-233-03	445-235-01	445-235-02			
						446-030-01	446-030-02	
445-112-xx	445-113-01	445-113-02						
445-172-xx	445-173-01	445-173-02	445-173-03	445-175-01	445-175-02			445-996
						446-090-01	446-090-02	445-996
								445-997
								445-997
								445-996
								445-997
445-172-xx	445-173-01	445-173-02	445-173-03	445-175-01	445-175-02			445-996
						446-090-01	446-090-02	445-996
								445-997
								445-997
								445-996
								445-997
445-252-xx	445-253-01	445-253-02	445-253-03	445-255-01	445-255-02			



6	7	8	9	10	11	12	13	14
Filter Screen	Rear wall closed	Rear wall with slots	Rear wall for terminals	Sealing between case and panel	Sealing behind front panel	Transparent door with lock	Transparent door with sash fastener	Packing
445-312-xx	445-313-01	445-313-02	445-313-03	445-315-01	445-315-02	446-040-01	446-040-02	445-998
								445-998
								445-999
								445-999
								445-998
								445-999
445-192-xx	445-193-01	445-193-02	445-193-03	445-195-01	445-195-02			
445-272-xx	445-273-01	445-273-02	445-273-03	445-275-01	445-275-02	446-100-01	446-100-02	445-992
						Flat sealing		445-992
						445-275-03		445-993
								445-993
								445-992
								445-993
								445-990
445-332-xx	445-333-01	445-333-02	445-333-03	445-335-01	445-335-02	446-150-01	446-150-02	
445-372-xx	445-373-01	445-373-02	445-373-03	445-375-01	445-375-02	446-050-01	446-050-02	445-994
						Flat transp. door	Flat transp. door	445-994
						447-050-01	447-050-02	445-995
								445-995
								445-994
								445-995
								445-991

# 3.2

## Electronic Enclosures Panel Instrument Cases Panel Instrument Cases Selection Chart

B	H	T (ca.)		t (ca.)		1	2	3	4	5
				Case	Fixing / Screws Page 12	"Panel-Clip"	Front panel Aluminium 1,5 mm	Cover plate Aluminium 1,5 mm		
	192	72	60,5	53,5	445-280	440-001	441-280	445-290	445-291	
			82,5	75,5	445-281	443-001	441-281			
			116,5	109,5	445-282	443-002	441-282			
			138,5	131,5	445-283		441-283			
			107,0	100,0	445-284		441-284			
			163,0	156,0	445-285		441-285			
			209,0	201,0	445-286		441-286			
	192	96	60,5	53,5	445-340	440-001		445-350	445-351	
			82,5	75,5	445-341	443-001				
			116,5	109,5	445-342	443-002				
			138,5	131,5	445-343					
			107,0	100,0	445-344					
			163,0	156,0	445-345					
			209,0	201,0	445-346					
	192	144	60,5	53,5	445-380	440-001		445-390	445-391	
			82,5	75,5	445-381	443-001				
			116,5	109,5	445-382	443-002				
			138,5	131,5	445-383					
			107,0	100,0	445-384					
			163,0	156,0	445-385					
			209,0	201,0	445-386					
	288	72	60,5	53,5	445-460	440-001	441-460	445-470	445-471	
			82,5	75,5	445-461	443-001	441-461			
			116,5	109,5	445-462	443-002	441-462			
			138,5	131,5	445-463		441-463			
			107,0	100,0	445-464		441-464			
			163,0	156,0	445-465		441-465			
			209,0	201,0	445-466		441-466			
	288	96	60,5	53,5	445-600	440-001		445-610	445-611	
			82,5	75,5	445-601	440-005				
	288	144	60,5	53,5	445-480	440-001	441-480	445-490	445-491	
			82,5	75,5	445-481	443-001				
			116,5	109,5	445-482	443-002				
			138,5	131,5	445-483					
			107,0	100,0	445-484					
			163,0	156,0	445-485					
			209,0	201,0	445-486					

6 Filter Screen	7 Rear wall closed	8 Rear wall with slots	9 Rear wall for terminals	10 Sealing between case and panel	11 Sealing behind front panel	12 Transparent door with lock Page 15	13 Transparent door with sash fastener Page 15	14 Packing
445-292-xx	445-293-01	445-293-02		445-295-01	445-295-02			
445-352-xx	445-353-01	445-353-02		445-355-01	445-355-02	446-110-01	446-110-02	
								445-989
								445-988
445-392-xx	445-393-01	445-393-02	445-393-03	445-395-01	445-395-02	446-120-01	446-120-02	
445-472-xx	445-473-01							
445-612-xx	445-613-01							
445-492-xx	445-493-01			445-495-01		446-130-01	446-130-02	



